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FOREST PEST MANAGEMENT

3430 BIOLOGICAL EVALUATION
R2-80-10

DWARF MISTLETOE SURVEYS

Bow River Section

Wyoming State Forestry Division

1980

United States
Department of
Agriculture

Forest Service

Forest Pest Management
Denver, Colorado

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ABSTRACT

In 1980, Wyoming State Forestry Division with assistance from Forest Pest Management, USFS, conducted dwarf mistletoe presuppression surveys on 640 acres located two miles southeast of Bow River Guard Station (USFS), Wyoming.

Five stands were identified and evaluated through use of RMYLD to estimate total merchantable yields with and without dwarf mistletoe suppression treatments. The possibility of converting the stands to fuelwood production is discussed.

INTRODUCTION

Lodgepole pine dwarf mistletoe (*Arceuthobium americanum* Nutt. ex. Engel.) is the most damaging disease in Rocky Mountain Region lodgepole pine (*Pinus contorta* Dougl. var. *latifolia* Engelm.). Greatest damage is reduced height and diameter growth of infected trees. Other adverse effects are reduced increment, timber quality, and increased mortality and susceptibility to other damaging agents.

Suppression of lodgepole pine dwarf mistletoe is possible through well-designed silvicultural prescriptions tailored to individual stands. The computer program Rocky Mountain Yield (RMYLD) (Edminster 1978) is designed to aid land managers in planning stand management. By predicting yield and growth reductions attributed to dwarf mistletoe, RMYLD allows managers to test different silvicultural systems to reduce dwarf mistletoe impacts.

SURVEY PROCEDURES

At the request of Herb Cottrell (Assistant State Forester, Wyoming State Forestry Division), Forest Pest Management with the aid of Dave Johnson (Supervisory Plant Pathologist) evaluated five lodgepole pine stands totaling 640 acres, for suitability for dwarf mistletoe suppression. The stands are located two miles southeast of Bow River Guard Station (USFS), Wyoming (T. 18 N., R. 80 W., Sec. 36 - Figures 1 & 2).

The stands were surveyed by Wyoming state personnel using the procedure outlined by Johnson and Hawksworth (1978). Information collection consisted of stand d.b.h., age, height, site index, dwarf mistletoe rating (DMR), and average number of lodgepole pine overstory trees on 1/50-acre plots.

DATA ANALYSIS

Data analysis and prescriptions were completed by Lloyd Fuller (Plant pathologist, FPM). Individual plot data were summarized by program DM Summary (Fuller 1980). Non-lodgepole type areas were excluded from final analysis. The five stands were processed through RMYLD to estimate volume for each stand with and without dwarf mistletoe control treatments. Specifications included in the program were as follows:

1. One precommercial thinning was permitted at initial stand entry. All subsequent thinnings must yield 350 board feet or 3000 cubic feet of merchantable volume per acre.

2. Merchantable cubic foot volume was computed for all trees 6.0 inches d.b.h. and larger, to a 4.0 inch top. Board

foot volume was computed for 6.5 inches d.b.h. and larger to 6.0 inch top. Average stand d.b.h. had to be 8.0 to be classed as sawtimber.

3. Thinnings were from above; however, no thinnings were programmed in stands where dwarf mistletoe rating was 3.0 or larger.

4. Rotation age was 120 years.

5. Interval between intermediate cuts was 20 years.

6. Growing stock levels (GSL) investigated for both initial and subsequent stand entries were 60, 80, and 100 in all combinations.

7. Time of thinning was investigated by thinning at present and ten-years from now.

Summaries of yields obtained at rotation age are presented in Tables 1-10. All five stands can benefit if thinnings for dwarf mistletoe control were initiated. The degree of dwarf mistletoe control and the volume yields vary according to the timing and intensity of thinnings. Control also varies according to the initial stand structure and current dwarf mistletoe infection.

STAND PRESCRIPTIONS

Sawtimber options

The following stand prescriptions are based on the assumption that the management objectives are (1) to grow sawtimber and (2) only one precommercial entry into the stand are planned.

Stand 1: Thin now to initial GSL 60 and subsequent 80. Delaying thinning significantly reduces yields.

Stand 2: Thin now to initial GSL 80 and subsequent 100.

Stand 3: Yields for this stand and diameter can be maximized if thinning is delayed ten years and then thinned to initial GSL 60 and subsequent 100. If delay of thinning is not desirable then initial GSL 60 and subsequent 80 is recommended.

Stand 4: Thin now to initial GSL 80 and subsequent 80. This allows for maximum merchantable bd. ft. and cu. ft. production. This option does not maximize tree diameter.

Stand 5: This stand may be thinned now (initial GSL 80 subsequent 80) or ten years from now (initial GSL 100 subsequent 80) and yields are not significantly altered.

Priority for treating stands is suggested as follows (from highest to lowest priority): 1, 4, 2, 5, 3.

Fuelwood management options

The increasing demand for fuelwood and the price for which it can be sold means managing for fuelwood production is a viable alternative. The advantages of fuelwood production are several:

1. Shorter rotation - merchantable cu.ft. volumes can be reached in 60-80 years.

2. Dwarf mistletoe impact is lessened - because management objectives do not require trees of large size, it is still possible to obtain the required cu.ft. volumes within a 70-90 year rotation without DM suppression.

3. Greater monetary return - because of the current market for lumber, volume is worth more as fuelwood.

4. Green fuelwood sales - through the use of properly marked and supervised green fuelwood cuttings it is possible to obtain a measure of DM suppression combined with some income.

Some disadvantages:

1. The managing agency must provide access to these areas.

2. If DM suppression is not conducted now, converting these stands to sawtimber production in the future is not possible.

3. Increased fire danger - fire danger will increase in two ways: (a) through increased numbers of non-professional woodcutters and (b) through increased ground fuels and improper slash disposal.

4. Increased liability - while it has not been proven in the courts yet, there does exist the problem of providing for the safety of woodcutters in designated woodcutting areas.

The following stand prescriptions are based on the assumptions that the management objectives are (1) to provide fuelwood, (2) one greenwood fuel sale or one precommercial thinning, and (3) the stand will be merchantable for fuelwood when volumes reach 896 cu.ft./acre (7 cords).

Stand 1: Cut now to GSL 80. Becomes merchantable at age 80 with 970 cu.ft./acre

Stand 2: Cut now to GSL 80. Becomer merchantable at age 60 with 1020 cu.ft./acre

Stand 3: Cut now to GSL 60. Becomes merchantable at age 60 with 1170 cu.ft./acre

Stand 4: Cut now to GSL 80. Becomes merchantable at age 60 with 990 cu.ft./acre

Stand 5: Cut now to GSL 60. Becomes merchantable at age 80 with 1430 cu.ft./acre

RMYLD is a management tool, and as such should not be used alone to justify decisions for or against action. RMYLD is used to predict volumes under various management regimes and to determine effects of dwarf mistletoe on productivity over time. The tables in RMYLD must be used with professional judgement and with knowledge of local conditions. No model can substitute for field knowledge of conditions.

Forest Insect and Disease Management specialists are available if assistance in designing dwarf mistletoe surveys or additional analysis of survey data is required.

LITERATURE CITED

EDMINSTER, C. B. 1978. RMYLD: Computation of yield tables for even-aged and two storied stands. RMFRES Res. Paper RM-199, 26 pp.

FULLER, L. R. 1980. DM SUMMARY. (A computer program written to summarize data collected according to Johnson and Hawksworth 1978).

JOHNSON, D. W. and F. G. HAWKSWORTH. 1978. An evaluation survey procedure for proposed thinning projects in lodgepole pine stands infested with dwarf mistletoe. (IN: Forest Insect and Disease Survey Methods, USDA Forest Service).

TABLE 1: Volumes (X100) yielded at rotation for Stand 1 based on 3 initial and 3 subsequent growing stock levels when thinned initially.

INITIAL: AGE 43 D.B.H. 2.4 HT. 14.7 STEMS/ACRE 697 SITE INDEX 52 DMR 1.1

INITIAL GSL	SUBSEQUENT GSL	FINAL D.B.H.	FINAL HT.	STEMS/ ACRE	STAND DMR	MERCH. VOL. Cu. Ft.	MERCH. VOL. Bd. Ft.
-	-	7.6	37	381	5.6	0	0
60	60	8.8	40	350	3.9	0	111
60	80	8.8	40	350	3.9	0	111
60	100	8.8	40	350	3.9	0	111
80	60	8.3	40	385	4.7	0	106
80	80	8.3	40	385	4.7	0	106
80	100	8.3	40	385	4.7	0	106
100	60	8.0	40	407	5.0	0	0
100	80	8.0	40	407	5.0	0	0
100	100	8.0	40	407	5.0	0	0

TABLE 2: Volumes (X100) yielded at rotation for Stand 1 based on 3 initial and 3 subsequent growing stock levels when thinned 10 years from present.

INITIAL: AGE 43 D.B.H. 2.4 HT. 14.7 STEMS/ACRE 697 SITE INDEX 52 DMR 1.1

INITIAL GSL	SUBSEQUENT GSL	FINAL D.B.H.	FINAL HT.	STEMS/ ACRE	STAND DMR	MERCH. VOL. Cu. Ft.	MERCH. VOL. Bd. Ft.
-	-	7.6	37	381	5.6	0	0
60	60	9.1	39	118	4.8	0	88
60	80	9.1	39	118	4.8	0	88
60	100	9.1	39	118	4.8	0	88
80	60	9.0	39	119	5.0	0	88
80	80	9.0	39	119	5.0	0	88
80	100	9.0	39	119	5.0	0	88
100	60	8.5	39	294	5.1	0	83
100	80	8.5	39	294	5.1	0	83
100	100	8.5	39	294	5.1	0	83

TABLE 3: Volumes (X100) yielded at rotation for Stand 2 based on 3 initial and 3 subsequent growing stock levels when thinned initially.

INITIAL: AGE 23 D.B.H. 2.4 HT. 14.4 STEMS/ACRE 1001 SITE INDEX 50 DMR 0.5

INITIAL GSL	SUBSEQUENT GSL	FINAL D.B.H.	FINAL HT.	STEMS/ ACRE	STAND DMR	MERCH. VOL. Cu. Ft.	MERCH. VOL. Bd. Ft.
-	-	7.3	45	493	5.6	0	0
60	60[1]	11.1	52	117	3.1	0	168
60	80[1]	10.7	52	160	3.3	0	171
60	100[1]	10.3	52	207	3.5	0	174
80	60[1]	10.6	55	126	3.0	0	186
80	80[1]	10.2	54	177	3.2	0	192
80	100[1]	9.9	54	225	3.4	30.4	196
100	60	8.2	51	501	4.1	41.1	170
100	80	8.2	51	501	4.1	41.1	170
100	100	8.2	51	501	4.1	41.1	170

[1] Requires 2 stand entries (1 precommercial and 1 commercial).

TABLE 4 : Volumes (X100) yielded at rotation for Stand 2 based on 3 initial and 3 subsequent growing stock levels when thinned 10 years from present.

INITIAL: AGE 23 D.B.H. 2.4 HT. 14.4 STEMS/ACRE 1001 SITE INDEX 50 DMR 0.5

INITIAL GSL	SUBSEQUENT GSL	FINAL D.B.H.	FINAL HT.	STEMS/ ACRE	STAND DMR	MERCH. VOL. Cu. Ft.	MERCH. VOL. Bd. Ft.
-	-	7.3	45	493	5.6	0	0
60	60 [2]	12.1	53	89	2.2	0	152
60	80 [2]	11.4	52	129	2.8	0	161
60	100 [2]	11.0	52	169	3.0	0	167
80	60	9.2	51	382	3.9	41.5	173
80	80	9.2	51	382	3.9	41.5	173
80	100	9.2	51	382	3.9	41.5	173
100	60	8.6	52	444	3.9	41.9	173
100	80	8.6	52	444	3.9	41.9	173
100	100	8.6	52	444	3.9	41.9	173

[2] Requires 3 stand entries (1 precommercial and 2 commercial).

TABLE 5: Volumes (X100) yielded at rotation for Stand 3 based on 3 initial and 3 subsequent growing stock levels when thinned initially.

INITIAL: AGE 22 D.B.H. 2.4 HT. 16 STEMS/ACRE 614 SITE INDEX 50 DMR 0.9

INITIAL GSL	SUBSEQUENT GSL	FINAL D.B.H.	FINAL HT.	STEMS/ ACRE	STAND DMR	MERCH. VOL. Cu. Ft.	MERCH. VOL. Bd. Ft.
-	-	8.3	47	273	6.0	0	89
60	60	9.6	52	310	4.8	37.6	158
60	80	9.6	52	310	4.8	37.6	158
60	100	9.6	52	310	4.8	37.6	158
80	60	9.1	53	310	5.3	34	140
80	80	9.1	53	310	5.3	34	140
80	100	9.1	53	310	5.3	34	140
100	60	8.5	52	317	5.6	0	120
100	80	8.5	52	317	5.6	0	120
100	100	8.5	52	317	5.6	0	120

TABLE 6: Volumes (X100) yielded at rotation for Stand 3 based on 3 initial and 3 subsequent growing stock levels when thinned 10 years from present.

INITIAL: AGE 22 D.B.H. 2.4 HT. 16 STEMS/ACRE 614 SITE INDEX 50 DMR 0.9

INITIAL GSL	SUBSEQUENT GSL	FINAL D.B.H.	FINAL HT.	STEMS/ ACRE	STAND DMR	MERCH. VOL. Cu. Ft.	MERCH. VOL. Bd. Ft.
-	-	8.3	47	273	6.0	0	89
60	60[1]	11.7	54	113	3.9	0	151
60	80[1]	11.1	54	158	4.1	0	156
60	100[1]	10.7	53	198	4.3	31.2	157
80	60	9.7	52	273	5.1	34	143
80	80	9.7	52	273	5.1	34	143
80	100	9.7	52	273	5.1	34	143
100	60	9.3	51	281	5.3	31.7	131
100	80	9.3	51	281	5.3	31.7	131
100	100	9.3	51	281	5.3	31.7	131

[1] Requires 2 stand entries (1 precommercial and 1 commercial)

TABLE 7: Volumes (X100) yielded at rotation for Stand 4 based on 3 initial and 3 subsequent growing stock levels when thinned initially.

INITIAL: AGE 23 D.B.H. 2.0 HT. 13 STEMS/ACRE 967 SITE INDEX 50 DMR 0.5

INITIAL GSL	SUBSEQUENT GSL	FINAL D.B.H.	FINAL HT.	STEMS/ ACRE	STAND DMR	MERCH. VOL. Cu. Ft.	MERCH. VOL. Bd. Ft.
-	-	7.1	43	514	5.6	0	0
60	60[1]	11.1	52	117	3.1	0	165
60	80[1]	10.7	51	160	3.3	0	168
60	100[1]	10.3	51	207	3.5	0	171
80	60	8.8	50	403	4.7	39	161
80	80	8.8	50	403	4.7	39	161
80	100	8.8	50	403	4.7	39	161
100	60	8.6	49	315	5.6	0	115
100	80	8.6	49	315	5.6	0	115
100	100	8.6	49	315	5.6	0	115

[1] Requires 2 stand entries (1 precommercial and 1 commercial)

TABLE 8: Volumes (X100) yielded at rotation for Stand 4 based on 3 initial and 3 subsequent growing stock levels when thinned 10 years from present.

INITIAL: AGE 23 D.B.H. 2.0 HT. 13 STEMS/ACRE 967 SITE INDEX 50 DMR 0.5

INITIAL GSL	SUBSEQUENT GSL	FINAL D.B.H.	FINAL HT.	STEMS/ ACRE	STAND DMR	MERCH. VOL. Cu. Ft.	MERCH. VOL. Bd. Ft.
-	-	7.1	43	514	5.6	0	0
60	60[2]	12.2	52	88	2.2	0	148
60	80[2]	11.5	51	126	2.8	0	153
60	100[2]	11.0	50	169	3.1	0	159
80	60[2]	11.8	52	94	2.2	0	160
80	80[2]	11.2	51	134	2.8	0	166
80	100[2]	10.7	51	179	3.1	0	173
100	60	8.9	50	382	4.8	37.9	156
100	80	8.9	50	382	4.8	37.9	156
100	100	8.9	50	382	4.8	37.9	156

[2] Requires 3 stand entries (1 precommercial and 2 commercial).

TABLE 9: Volumes (X100) yielded at rotation for Stand 5 based on 3 initial and 3 subsequent growing stock levels when thinned initially.

INITIAL: AGE 26 D.B.H. 2.0 HT. 13 STEMS/ACRE 967 SITE INDEX 50 DMR 0.1

INITIAL GSL	SUBSEQUENT GSL	FINAL D.B.H.	FINAL HT.	STEMS/ ACRE	STAND DMR	MERCH. VOL. Cu. Ft.	MERCH. VOL. Bd. Ft.
-	-	6.9	44	691	4.6	0	0
60	60[1]	9.8	45	129	2.1	0	136
60	80[1]	9.6	45	179	2.3	0	140
60	100[1]	9.3	45	234	2.5	0	142
80	60	8.1	45	505	3.2	35.6	148
80	80	8.1	45	505	3.2	35.6	148
80	100	8.1	45	505	3.2	35.6	148
100	60	7.6	45	584	3.2	34.6	0
100	80	7.6	45	584	3.2	34.6	0
100	100	7.6	45	584	3.2	34.6	0

[1] Requires 2 stand entries (1 precommercial and 1 commercial).

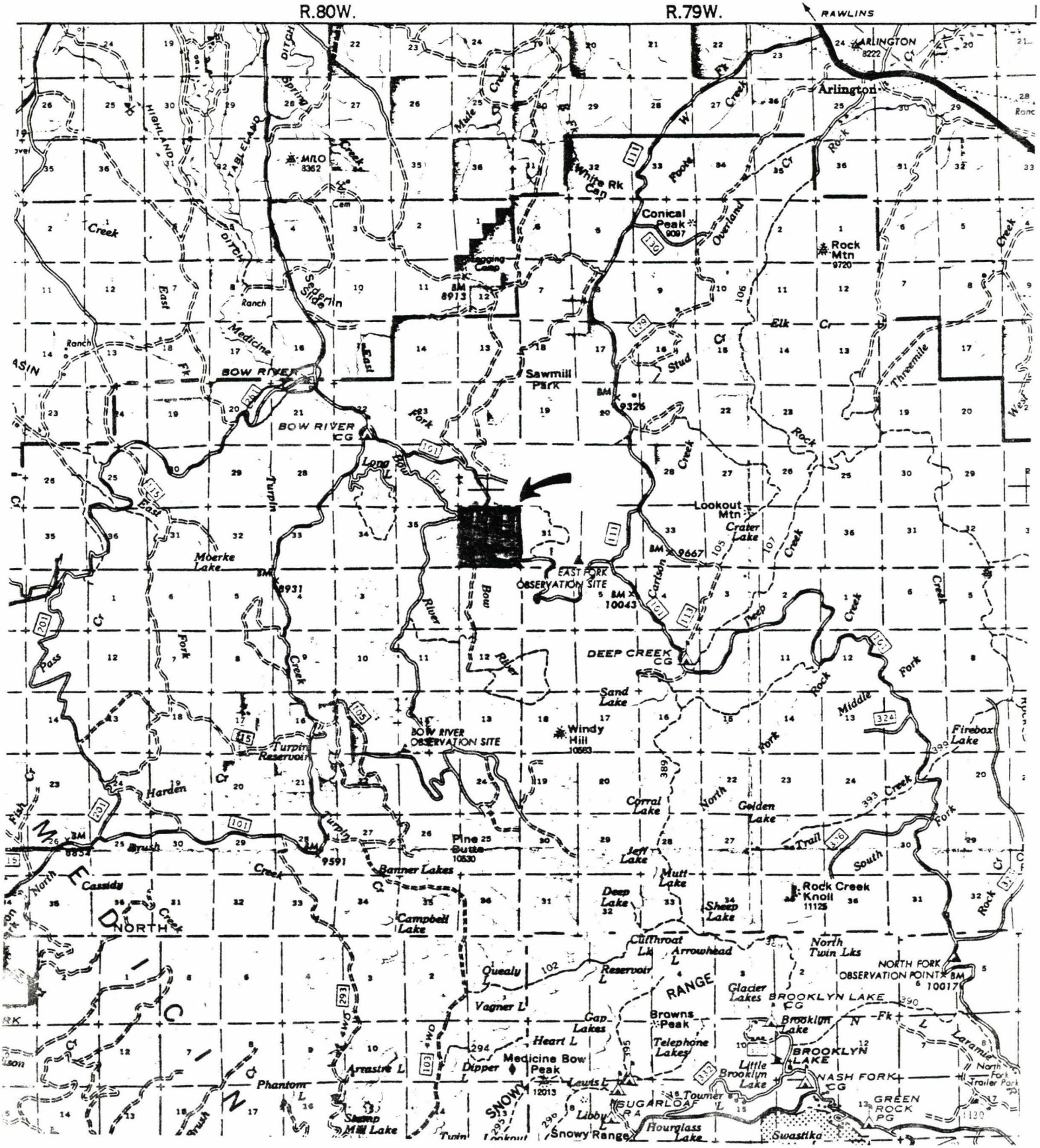
TABLE 10: Volumes (X100) yielded at rotation for Stand 5 based on 3 initial and 3 subsequent growing stock levels when thinned 10 years from present.

INITIAL: AGE 26 D.B.H. 2.0 HT. 13 STEMS/ACRE 967 SITE INDEX 50 DMR 0.1

INITIAL GSL	SUBSEQUENT GSL	FINAL D.B.H.	FINAL HT.	STEMS/ ACRE	STAND DMR	MERCH. VOL. Cu. Ft.	MERCH. VOL. Bd. Ft.
-	-	6.9	44	691	4.6	0	0
60	60[1]	10.6	45	126	0.8	0	121
60	80[1]	10.1	45	182	1.1	0	127
60	100[1]	9.9	45	233	1.3	0	134
80	60	8.5	43	439	2.6	33.7	139
80	80	8.5	43	439	2.6	33.7	139
80	100	8.5	43	439	2.6	33.7	139
100	60	8.1	45	508	2.6	35.9	149
100	80	8.1	45	508	2.6	35.9	149
100	100	8.1	45	508	2.6	35.9	149

[1] Requires 2 stand entries (1 precommercial and 1 commercial).

FIGURE 1: LOCATION OF DWARF MISTLETOE SUPPRESSION AREA.



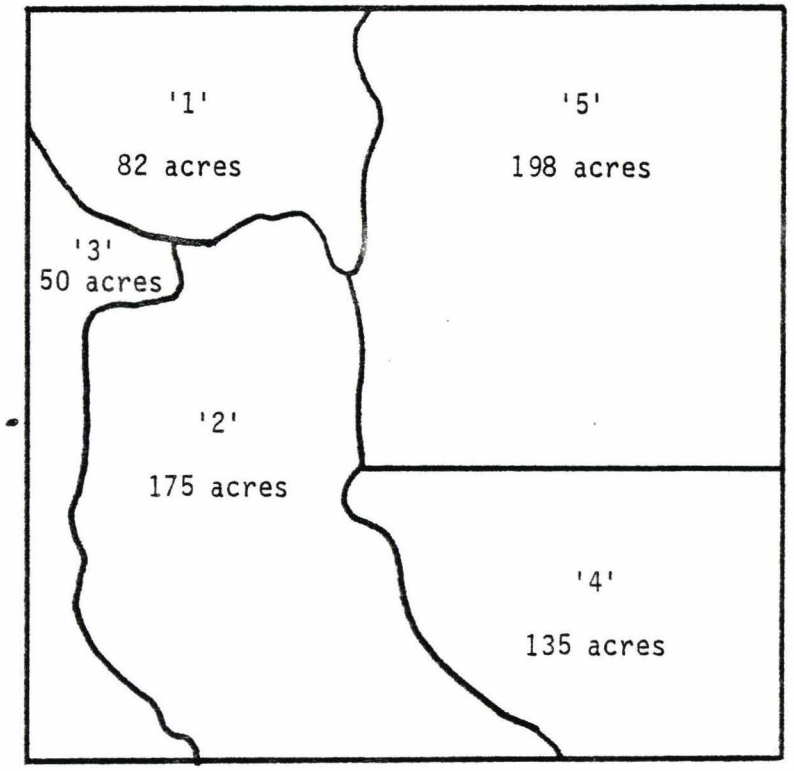


FIGURE 2: Dwarf mistletoe suppression area
T. 18 N., R. 80 W., Sec. 36.